Apprenticeship and Industry Training

Crane and Hoisting Equipment Operator—Wellhead Boom Truck Operator

Apprenticeship Course Outline

34-406 (2006)

Alberta
Advanced Education
Apprenticeship and Industry Training

ALBERTA ADVANCED EDUCATION CATALOGUING IN PUBLICATION DATA

Alberta. Alberta Advanced Education. Apprenticeship and Industry Training.
Crane and hoisting equipment operator wellhead boom truck operator :
apprenticeship course ouline.

ISBN 0-7785-4774-4

1. Cranes, derricks, etc. - Maintenance and repair - Study and teaching - Alberta.
2. Hoisting machinery - Maintenance and repair - Study and teaching - Alberta.
3. Apprentices - Alberta. 4. Occupational and training - Alberta. 5. Apprenticeship programs -Alberta. I. Title. II. Series: Apprenticeship and training industry.

HD4885.C2.C72.A333 2006 372.27

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Crane and Hoisting Equipment Operator—Wellhead Boom Truck Operator

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Course Outline

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Apprenticeship and Industry Training System

Apprenticeship is post-secondary education with a difference. It helps ensure Alberta has a steady supply of highly skilled employees, the foundation of our economy's future health and competitiveness.
Apprentices in more than 50 trades and crafts spend between one and four years learning their trade - 80% of the time on the job under the supervision of a certified journeyman or qualified tradesperson. The balance of the program is technical training in the theory, skills and technologies of their trade.
To become certified journeymen apprentices must learn theory and skills, and they must pass examinations. Requirements for certification—including the content and delivery of technical training—are developed and updated by the Alberta Apprenticeship and Industry Training Board (the Board) and a network of local and provincial industry committees.
The graduate of the Crane and Hoisting Equipment Operator—Wellhead Boom apprenticeship training is a journeyman who will be able to:

- correctly use and care for tools and materials which are required to carry out the normal service and maintenance of the machines of the industry.
- operate and describe functions of the major and minor components of boom trucks.
- recognise and identify malfunctions and the proper procedures related thereto.
- recognise and evaluate conditions which are potentially hazardous to safe machine operation.
- interpret and apply visual and audio communication.

Apprenticeship and Industry Training Committee Structure

While government supports Alberta's apprenticeship and industry training system, it is driven by industry, a term which includes both employers and employees. The Alberta Apprenticeship and Industry Training Board, with the support of Alberta Advanced Education, oversees the system. But the system relies on a network of industry committees. These committees include local and provincial apprenticeship committees (LACs and PACs) in the designated trades and occupational committees (OCs) in the designated occupations, as well as other committees such as provisional committees established before the designation of a new trade or occupation comes into effect. All these committees are composed of equal numbers of employers and employees. The network of industry committees is the foundation of Alberta's apprenticeship and industry training system.

Local Apprenticeship Committees (LAC)

Wherever there is activity in a trade, the Board can set up a LAC. The Board appoints equal numbers of employees and employers for terms of up to three years. The committee appoints a member as presiding officer. Local Apprenticeship Committees:

- monitor the apprenticeship system, and the progress of apprentices in their trade, at the local level.
- help settle certain kinds of issues between apprentices and their employers.
- recommend improvements in apprenticeship training and certification to their trade's provincial apprenticeship committee.
- make recommendations to the Board regarding the appointment of members to their trade's PAC.

Provincial Apprenticeship Committees (PAC)

The Board establishes a PAC for each trade and, based on PAC recommendations, appoints a presiding officer and equal numbers of employees and employers for terms of up to three years. Most PACs have nine members. Provincial Apprenticeship Committees:

- identify the training needs and content for their trade.
- recommend to the Board the standards for training and certification for their trade.
- monitor the activities of local apprenticeship committees in their trade.
- make recommendations to the Board about the designation of trades and occupations.
- determine whether training of various kinds is equivalent to training provided in an apprenticeship program in the trade.
- may participate in resolving any apprenticeship-related disputes between employers and employees.

Crane and Hoisting Equipment Operator— PAC Members

Mr. J. Lane	Ft. McMurray	Presiding Officer
Mr. D. Cadotte	Lacombe	Employer
Mr. L. Tucker	Edmonton	Employer
Mr. B. Tario	Calgary	Employer
Mr. D. Provencal	Ft. McMurray	Employer
Mr. A. McKernon	Rocky Mountain House	Employer
Mr. M. Packolyk	Slave Lake	Employer
Mr. S. Murphy	Wainwright	Employee
Mr. E. Pinksen	Ft. McMurray	Employee
Mr. B. Kosmack	Calgary	Employee
Mr. M. McDonnell	Edmonton	Employee
Mr. B. Mahon	Onoway	Employee
Mr. L. Schnepf	Red Deer	Employee

The Alberta Apprenticeship and Industry Training Board (Board)

The mandate of the Alberta Apprenticeship and Industry Training Board relates to the standards and requirements for training and certification in programs under the *Apprenticeship and Industry Training Act*. The Board provides advice to the Minister of Advanced Education on the training and certification of people in designated trades and occupations and on the needs of the Alberta labour market for skilled and trained persons. The Board also makes orders and regulations respecting standards and requirements for apprenticeship programs and the training of apprentices and for training and certification in designated trades and occupations, and the criteria or requirements for granting and recognizing trade and other certificates.

The 13-member Board consists of a chair, eight members representing trades and four members representing other industries. Employer and employee representatives equally represent the trades and other industry members.

Safety Education

Safe working procedures and conditions, accident prevention and the preservation of health are of primary importance in apprenticeship programs in Alberta. These responsibilities are shared and require the joint efforts of government, employers, employees and the public. Therefore, it is imperative that all parties become aware of circumstances that may lead to injury or harm. Safe learning experiences and environments can be created by controlling the variables and behaviours that may contribute to or cause an accident or injury.

It is generally recognized that a safe attitude contributes to an accident free environment. Everyone will benefit as a result of a healthy, safe attitude towards prevention of accidents.

A tradesperson is possibly exposed to more hazards than any other person in the work force and, therefore, should be familiar with and apply the Occupational Health and Safety Act and Regulations dealing with personal safety and the special safety rules applying to each task.

Legal and Administrative Aspects of Safety

Accident prevention and the provisions of safe working conditions are the responsibilities of an employer and employee.

Employer's Responsibilities

The employer is responsible for:

- providing and maintaining safety equipment and protective devices.
- ensuring proper safe work clothing is worn.
- enforcing safe working procedures.
- providing safeguards for machinery, equipment and tools.
- observing all accident prevention regulations.
- training employees in the safe use and operation of equipment.

Employee's Responsibilities

The employee is responsible for:

- working in accordance with the safety regulations pertaining to the job environment.
- working in such a way as not to endanger themselves or fellow employees.

Occupational Health and Safety's Responsibilities:

Occupational Health and Safety (Alberta Human Resources and Employment) will conduct periodic inspections of the workplace to ensure that safety regulations for industry are being observed.

Technical Training Establishment

The Crane and Hoisting Equipment Operator – Wellhead Boom Truck Operator apprenticeship training program is the responsibility of Alberta Advanced Education, Apprenticeship and Industry Training. For information regarding the delivery of the program, please contact the nearest Career Development Centre.

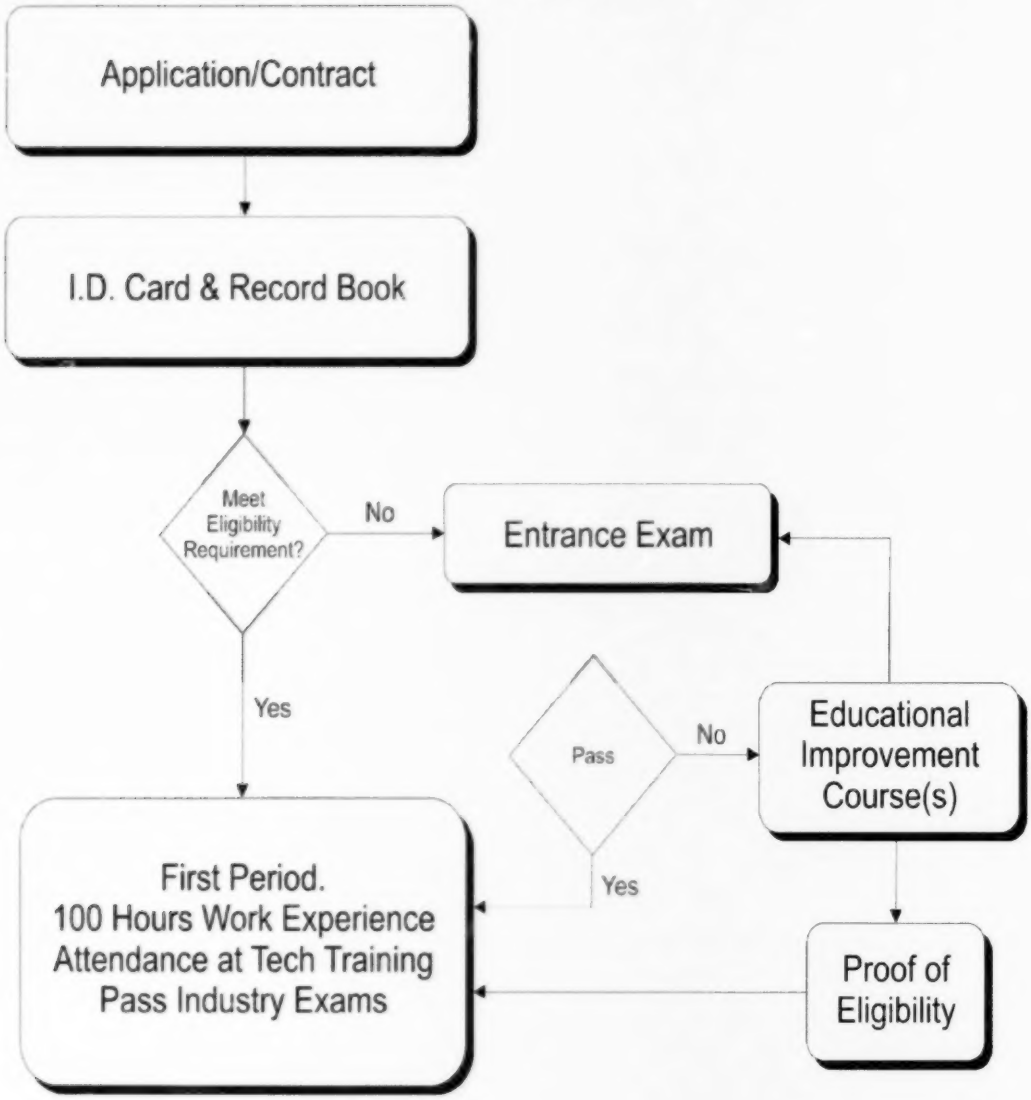
Procedures For Recommending
Revisions To The Course Outline

Apprenticeship and Industry Training, Industry Programs and Standards has prepared this course outline in partnership with the Crane and Hoisting Equipment Operator—Provincial Apprenticeship Committee.
This course outline was approved on March 20, 2006 under the authority of the Alberta Apprenticeship and Industry Training Board on a recommendation from the Provincial Apprenticeship Committee. Valuable input is acknowledged from industry and the institutions.
Any concerned citizen or group in the Province of Alberta may make recommendations for change by writing to:

Crane and Hoisting Equipment Operator - Provincial Apprenticeship Committee
c/o Industry Programs and Standards
Apprenticeship and Industry Training
10th floor, Commerce Place
10155 - 102 Street
Edmonton, AB T5J 4L5

It is requested that recommendations for change refer to specific areas and state references used. Recommendations received will be placed before regular meetings of the Provincial Apprenticeship Committee.

Apprenticeship Route toward Certification



Crane and Hoisting Equipment Operator—Wellhead Boom Truck Operator Training Profile

FIRST PERIOD
(5 Days – Total of 40 Hours)

Day 5 is reserved for theory, load chart and practical testing

SECTION ONE

WELLHEAD BOOM TRUCK THEORY
20 Hours

A
Boom Truck Components
2 Hour

B
Boom Truck Inspections
1 Hour

C
Rules and Responsibilities
1 Hours

D
Safe Operating Practices
4 Hours

E
Principles of Leverage
1 Hours

F
Areas of Operation
1 Hour

G
Pre-Lift Planning and Load Chart Calculations
8 Hours

H
Rigging Hardware, Wire Rope and Rigging Safety
2 Hours

WELLHEAD BOOM TRUCK PRACTICAL
12 Hours

A
Load Rigging Practices
2 Hours

B
Hands on Boom Truck Operator Training
10 Hours

NOTE: The hours stated are for guidance and should be adhered to as closely as possible. However, adjustments must be made for rate of apprentice learning, statutory holidays, registration and examinations for the training establishment and Apprenticeship and Industry Training.

FIRST PERIOD TECHNICAL TRAINING
CRANE AND HOISTING EQUIPMENT OPERATOR—WELLHEAD BOOM TRUCK OPERATOR CRAFT
COURSE OUTLINE

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE:.....WELLHEAD BOOM TRUCK THEORY .....20 HOURS

A. Boom Truck Components .....2 Hour

Outcome: Explain and demonstrate knowledge of boom trucks and components.

1. Identify the components of hydraulic boom trucks and/or articulating boom trucks.
    a) truck chassis
    b) rear/front stabilizers
    c) turret or pedestal (including mounting bolts)
    d) swing circle
    e) base or heel section
    f) telescopic powered and manual boom sections
    g) boom extensions
    h) main hoist
        i) main hoist line
        ii) main hoist block
        iii) winch
        iv) sheaves
    i) auxiliary hoist
        i) auxiliary hoist line (whip)
        ii) auxiliary hoist ball and hook (headache overhaul)
    j) boom
        i) boom section
        ii) telescoping sections
        iii) pinned sections
        iv) boom extension cylinders
        v) boom lift cylinders
        vi) boom wear pads
        vii) rest (cradle)
        viii) sheaves
    k) outriggers
        i) outrigger beams
        ii) outrigger jacks
        iii) outrigger cylinders
        iv) outrigger pads (floats or pontoons)
        v) front bumper outrigger
    l) swing assembly
        i) pedestal
        ii) turret
        iii) rotation bearing (slewing ring, swing circle, ball race)
    m) carrier
        i) frame
        ii) sub frame
        iii) bed (optional)
        iv) brakes
        v) tire types (highway)
        vi) counterweight(s) (front bumper)
    n) control system

o) load moment devices
p) lock-outs

B. Boom Truck Inspections ..... 1 Hour

Outcome Explain the importance of boom truck inspections and the requirements for maintaining equipment records.

1. Explain the importance of regular inspections.
2. Explain the importance of keeping regular records of inspections and maintenance to ensure the following:
   a) safer equipment
   b) minimal breakdowns of equipment
   c) lower operating costs
   d)
3. Identify and describe the frequency and types of equipment inspections.
4. Perform and document equipment inspections.
5. Describe the legislative requirements for inspections and log books.
6. Identify and describe manufacturers' inspection requirements.

C. Rules and Responsibilities ..... 1 Hours

Outcome: Identify the rules and regulations that govern the wellhead boom truck operator.

1. Identify and describe:
   a) the boom truck owner's responsibilities
   b) the boom truck operator's responsibilities
   c) the supervisor's responsibilities
2. Identify the codes and standards that govern/regulate the wellhead boom truck operator.
   a) CAN/CSA-Z150-98
   b) Crane and Hoisting Equipment Operator Trade Regulation
   c) Occupational Health and Safety Act (construction and general)
   d) Bill C45

D. Safe Operating Practices ..... 4 Hours

Outcome: Explain and demonstrate knowledge of safe operating practices.

1. Describe the basic safe operating practices for:
   a) the proper setup and use of outriggers
   b) levelling the boom truck and the effects of not being level
   c) two-blocking
   d) not allowing personnel to ride on loads and hooks
   e) avoiding rapid swings
   f) shock loading – causes and prevention
2. Identify and describe how boom trucks can be overloaded by:
   a) lifting loads in excess of the gross capacity of the crane
   b) booming down and increasing load radius
   c) telescoping out and increasing load radius
3. Explain the hazards of side loading crane booms.
   a) dragging load
   b) out of level set up
   c) side loading
4. Describe the difference between structural and stability factors and the impact on boom truck operation.

5. Describe the following procedures for working around power lines:
   a) maintaining limits of approach
   b) ensuring that no worker comes in contact with the crane or load
   c) using long, clean lengths of nylon rope for tag lines
   d) using a dedicated signal person to watch approach limits
6. Describe the following procedures in the event of a power line contact:
   a) warn people to stay away
   b) operator remains at the controls
   c) where possible, remove crane from power lines
   d) operator exits the boom truck if necessary
7. Identify the limits of approach (applicable legislation).
8. Describe and perform the standard hand signals.
9. Identify the causes and prevention of the following types of crane accidents:
   a) stability/structural failure
   b) rigging failure

E. Principles of Leverage ..... 1 Hours

Outcome: Explain principles of leverage.

1. Describe the principles of leverage and the relationship between leverage and stability.
2. Define the following terms:
   a) leverage of a crane
   b) leverage of a load
   c) tipping axis
   d) centre of rotation
   e) centre of gravity
   f) Identify the symbol for centre of gravity.
   g) identify and determine the centre of gravity for major boom trucks:
      i) centre of gravity of a crane
      ii) centre of gravity of a load
      iii) centre of gravity location during rotation of upper works
3. Define fulcrum and how it applies to crane operation.
4. Describe the load leverage principles including:
   a) leverage and stability
   b) stability vs. instability
   c) effect of tipping axis location on stability and capacity
5. Describe changes in crane leverage during rotation of upper works:
   a) most stable area
   b) less stable area
   c) least stable area

6. Describe changes in crane capacity during rotation of upper works for:
    a) greatest capacity
    b) less capacity
    c) least capacity
7. Describe the load moment for:
    a) tipping moment
    b) resisting moment
8. Describe the tipping axis location as the upper structure rotates.
9. Describe forward stability rating in percentage of tipping
10. Describe backward stability for a boom truck
11. Describe static load vs. dynamic load.
12. Describe the effect of the load on the boom:
    a) telescopic (stiff) booms
        i) load on boom hoist
        ii) cylinders (high angle)
        iii) load taken on the boom in bending/deflection
        iv) compression
    b) articulating booms
        i) load on boom hoist
        ii) cylinders (high angle)
        iii) load taken on the boom in bending/deflection
        iv) compression

F. Areas of Operation ..... 1 Hour UOC: 001010

Outcome: Identify and explain areas of operation.

1. Describe the importance of areas of operation for boom trucks.
2. Identify the swing area.
3. Describe the division of swing area into quadrants.
4. Identify and describe working areas.

G. Pre-Lift Planning and Load Chart Calculations ..... 8 Hours UOC: 001010

Outcome: Explain and demonstrate knowledge and skill in planning a lift.

1. Describe how the factors listed below affect load chart conditions:
    a) boom length
    b) operating radius
    c) boom angle
    d) boom truck configuration
    e) load weight
2. Describe and perform load chart calculations by interpreting load capacity charts from various manufacturers to:
    a) identify and describe gross and net capacities
    b) calculate total load
    c) identify the difference between structural and stability values found in load capacity charts
    d) identify quadrants of operation from load capacity chart data
    e) interpret all information and warning notes contained in the load capacity charts and operator's manual

H. Rigging Hardware, Wire Rope and Rigging Safety ..... 2 Hours

Outcome: Explain and demonstrate knowledge and skill in safely rigging a load.

1. Interpret breaking strengths, safety factors and safe working loads for slings, hoist ropes and pendants.
2. Perform wire rope and nylon web sling inspection.
3. Determine sling types, sizes and configurations for lifting loads by interpreting sling capacity charts.
4. Describe the importance of ensuring proper sling angles for multiple leg slinging of loads.
5. Identify criteria for taking wire rope slings and hoist ropes out of service for:
   a) broken wires
   b) core failures
   c) localized damage
   d) lubrication
6. Describe proper hoist line installation procedures.
7. Identify and describe uses for spreader bars and lift beams.
8. Identify and describe spreader bar/lift beam standards and inspection criteria.
9. Identify and describe the proper use of hooks and inspection criteria.
10. Identify and describe the proper use of shackles and inspection criteria.
11. Identify and describe the proper use of eye bolts and inspection criteria.
12. Identify and describe the proper installation techniques for cable clamps.
13. Describe and perform wedge socket installation..
14. Describe common wire rope termination efficiencies.
15. Identify the types of chain that can be used for hoisting.
16. Identify chain inspection criteria.
17. Describe hoist and chain inspections.

SECTION TWO: ..... WELLHEAD BOOM TRUCK PRACTICAL ..... 12 HOURS

A. Load Rigging Practices ..... 2 Hour

Outcome: Explain and demonstrate safe rigging practices.

1. Describe the effects of load centre of gravity and sling location on load stability.
2. Identify and describe both safe and unsafe rigging practices.
3. Identify and describe sheave standards and inspection criteria.
4. Identify and describe drum standards and inspection criteria.
5. Identify and describe rigging hitches.
6. Describe procedures for taking defective rigging components out of service.

B. Practical Boom Truck Operator Training ..... 10 Hours

Outcome: Explain and demonstrate the safe operation of a wellhead boom truck.

1. Describe and perform pre-operational inspections to:
   a) check and top up all oil/fluid levels
   b) check the condition of belts, tires, pins and keepers
   c) check the condition of mounting bolts and weldments
   d) check the condition and spooling of wire rope hoist line
   e) check the condition of the load block, hook, wedge/socket and safety latch

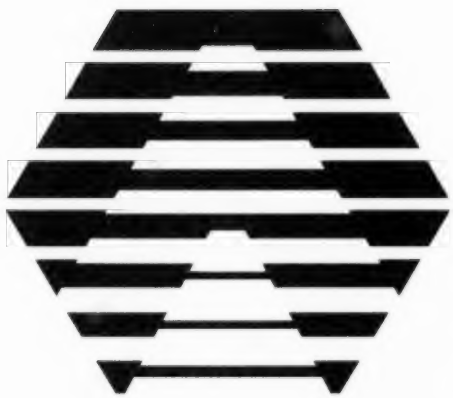
f) check the condition of all slings and rigging hardware

2. Document any unsafe items in the boom truck log book.
3. Describe and perform the removal from service of any unsafe items.
4. Measure the load radius.
5. Determine the total load from the net load.
6. Apply the total load to the values in the load capacity chart, area diagram and range diagram, to determine where the load can be placed prior to and after hoisting.
7. Set up and level the boom truck in accordance with the manufacturer's instructions, crane capacity and site conditions. Demonstrate proper use of outriggers, pads and blocking.
8. Rig different loads with proper sling sizes and configurations.
9. Describe, perform and follow standard hand signals.
10. Lift and place loads within the capacity of the machine.
11. Operate the equipment in a safe, smooth and controlled manner.

EXAMINATIONS

Upon completion of the course, the candidate will be required to successfully complete the following examinations:

- A hands-on practical examination of the candidate's performance skills. This examination will be a maximum of two and one half hours in duration.
- A written examination administered by Alberta Advanced Education. This examination will be a maximum of three hours in duration.



Excellence through training and experience

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